

# ROYAL GARDENS, KEW.

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## BULLETIN

OF

## MISCELLANEOUS INFORMATION.

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No. 7.]

JULY.

[1887.

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### XII.—ANNATTO.

(*Bixa Orellana*, L.)

From the seeds of *Bixa Orellana* is obtained a colouring substance which is known under various names. It is called Annatto, Arnatto, or Annotto in Jamacia ; in the French islands it is known as Roucou, Urucu, Rocour ; while on the Spanish Main the Indians call it Achiotl. This colouring substance has long been known and used for various purposes. It is, however, liable to so many fluctuations, and the prices generally are so low, that it has never received serious attention in British Colonies, and hence few, if any, plantations have been exclusively devoted in such colonies to the Annatto plant. The Annatto of commerce is practically, therefore, a forest product obtained from wild or semi-wild plants, and the supply has only kept pace with the demand. Of late years a slight revival has taken place in the use of Annatto, especially in America, and inquiries have in consequence been made for information as regards culture and preparation, which it is proposed to supply as briefly as possible in the following notes.

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PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

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1887.

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The Annatto plant is a native of tropical America, but is now widely distributed throughout most tropical countries, where it is often found in a naturalized state, and growing freely in waste places and around native villages. It seldom attains a greater height than 8 to 12 feet, but is of stout bushy habit, and well furnished with bright heart-shaped pointed leaves. These are about 4 inches long and 2 broad, with rather a long petiole, and dotted. The showy flowers are produced in loose panicles at the ends of the branches, with five petals of a rosy and sometimes of a white colour. The stamens are very numerous, yellow, tipped with purple. The fruit consists of a dry ovate or mitre-shaped capsule covered with soft spinules, brown or green when ripe, splitting into two valves, on the inside of which are attached numerous (30 to 40) seeds. These seeds are about the size and shape of grape seeds, and covered with a waxy substance (the testa), which readily stains the fingers a red colour. This waxy substance covering the seeds yields the Annotto of commerce, and gives the plant its chief industrial value.

Annotto plants are readily raised from seed, and are of a hardy character. They prefer cool, moist situations, such as the banks of streams, and luxuriate in shaded places in and around dwellings. They are, however, readily established on comparatively poor soils, and although the growth under such circumstances is necessarily less robust, the yield in seeds is fairly large. If a plantation of Annatto is proposed to be established, plants may first be raised in seed beds in nurseries, and transplanted during the rainy season when about 6 or 8 inches high. The distance apart of permanent plants may vary from 10 to 15 or 20 feet, according to the character of the soil and the nature of any subsidiary cultivation that may be carried on. In many cases seeds may be sown at once in the places where the permanent plants are desired, and of the seedlings grown, the strongest only is ultimately retained. As cattle, horses, and goats do not eat the leaves of Annatto, planters in the West Indies often utilize hilly pasture lands by planting Annatto upon them. In this way very little expense is incurred for maintenance; and should the price of the produce prove of an unremunerative character, no steps are taken to gather the crop.

The range of cultivation for Annatto is a wide one. In the West Indies it grows readily from sea-level up to an altitude of 2,000 feet. In Ceylon it is known to grow up to 3,000 feet, but it is particularly flourishing in the lowlands. It appears to be well adapted for moist warm situations, with a mean annual temperature of 75° to 80° Fah. It requires an abundant rainfall, and hence is not suitable for arid situations, or those subject to prolonged droughts. Under favourable circumstances Annotto plants begin to yield seed in about two years, and remain fruitful for a long period.

The plant is supposed to be wild at Jamaica and St. Lucia, in the British West India Islands, and in the former island it has been extended by partial cultivation. The export of Annatto seeds from Jamaica in 1886 consisted of 369,284 pounds, of the value of 7,693*l*. At Guadeloupe, one of the principal French islands, Roucou, as it is there called, forms an important article of export, and the returns show the existence of 48 Roucou plantations, employing 1,044 labourers. The export in 1883 consisted of 700,500 kilos of prepared Roucou. [Flag Annatto.]

As regards British Guiana, the Superintendent of the Botanic Garden, writing in 1881, remarks as follows:—"Though the Annatto plant is a native of British Guiana, and abounds on the banks of some of the rivers, it does not appear to be cultivated at all, nor is the fruit of the



" wild plant turned to any commercial account. All the Annatto that is exported from British Guiana is first imported, and the source from which it comes, so far as I have been able to gather, is French Guiana. " A portion may occasionally come from Surinam." As may naturally be expected, a plant of so hardy a character, and the seed of which is so easily carried from place to place, has long been established throughout the Tropics. At Ceylon the plant is supposed to have been introduced by the Dutch, and so long ago as 1829 it was used as a dye plant by basket makers at Kalutara.

In the Report of the Director of the Botanic Gardens, Ceylon, for 1881, it is mentioned, " Several gentlemen have made inquiries as to the mode in which Annatto is prepared for the market; and, as I could find no very definite published account, I applied to the authorities at the Royal Gardens, Kew, for information, and have received several communications from them, the most important being from Mr. Vilmorin's report on 'Produits Agricoles non Alimentaires' (Paris Exhibition, 'Rapports du Jury International'). The following is a summary:—*Bixa Orellana* is native to Tropical America, but fairly naturalized in other hot countries, as in India and Ceylon. Annatto (Roucou is the French name), however, is prepared almost wholly in the French colonies, chiefly Cayenne (French Guiana) and Guadeloupe (which each produce about 400—500,000 kilos), but lately taken up also in Réunion and the Indian Possessions of France. " The Guadeloupe samples were the best at the Paris Exhibition."

In India the two forms of the species, one with pink flowers and brown capsule and the other with white flowers and greenish capsule, are well represented. Dr. Buchanan, writing in 1833, mentions the Annatto plant as follows: "The *Bixa*, an American plant, is now rapidly spreading over Bengal, the inhabitants having found it a useful yellow dye, which they employ to give their cloths a temporary colour in the *Dolyatra*, or festival of Krishna. With this also they colour the water, which, on the same occasion, they throw at each other with squirts. For these purposes it is well qualified, as the colour easily washes out, and the infusion has a pleasant smell. By them it is called *Lotkan*, and they say that before it grew commonly in the country, the dry fruit was brought from Patna. Probably some other fruit was then brought, and its use has been superseded by that of the *Bixa*, to which the natives have given the old name, as there can be no doubt of its being an American plant, and its fruit could scarcely have been brought here from the West Indies. In many parts it is called European Turmeric."

As regards the preparation of Annatto it would appear that various methods are used, with the result that an article is produced with a wide range of merit and a corresponding variation in market value. At the request of this establishment, inquiry was made respecting the method adopted in French Guiana, and the Superintendent of the Botanic Gardens at British Guiana obtained the following from the French Consul at that place. The manufacture of Roucou is as follows:

" Pick the small red seeds from the husk, put them in fresh and clear water to soak for not less than two days, then pass them through a mill or crusher. When crushed let them remain 24 hours in fresh water; after this pass them through a sieve; the residue is again passed through the mill until nothing remains of the seeds.

" The produce of the seeds so prepared is put in water until it has precipitated; the surface water is then made to run out. After the surface water has become perfectly clear, the paste is boiled during



“ four or five hours time. After this process has been gone through, the paste is placed in cases with curing holes, with a weight placed on it, and a cloth at the bottom to prevent the finely crushed powder from passing through. When the above process has been gone through, the paste should be in a fit state for shipment. It is then packed in layers, with plantain leaves between each layer to retain the necessary amount of moisture and to check acidity.”

A method for preparing Annatto, at one time prevalent in the West India Islands, is well described by Dr. Macfadyen in the *Flora of Jamaica*, p. 42, in the following words:—

“ It is from the pulp which covers the seeds of this tree that the substance known by the names of *Arnotta* or *Annotta* in England, and *Roucou* in France, is procured. It is collected by pouring boiling water on the seeds in any convenient vessel; after stirring the whole, the water, with the farina suspended in it, is poured off; and this is repeated till the naked seeds are left. The water, after allowing it to stand for some time, is then to be poured off clear, leaving the *Arnotta* which has settled at the bottom. The addition of an acid is said to hasten the process. The sediment is afterwards to be placed in shallow vessels and dried by evaporation in the shade. When it has acquired a proper consistence, it is to be made into cakes or balls; after which it is to be thoroughly dried till hard, when it is in a fit state to be sent to market.”

To this Dr. Macfadyen adds some general remarks as regards Annatto and its local uses in the West Indies, which, as they occur in a book now comparatively scarce, may be usefully included in these notes:—

“ *Annatto* is of a resinous nature, and dissolves more completely in alcohol than in water. When prepared for market it is moderately hard, of a brown colour externally, [and dull red within. It is occasionally imported in cakes of two or three pounds weight, of the consistence of paste, wrapped up in large flag [banana] leaves, and packed in casks. The roll *Annatto* is much harder, and of a very superior quality, containing a larger proportion of the colouring matter. It was formerly employed in dyeing silk, to produce the colour called *Aurora*. As the addition of an alkali increases its solubility, it is the practice, when used in dyeing, to mix it with at least its own weight of potash. It is now, however, but seldom employed as a dye in Great Britain. The Indians mix it with oil, or with lime-juice and a gum, to make the crimson paint with which they ancient their bodies, not so much for the purpose of ornament as to protect them from the attacks of insects. It is said to be esteemed by painters as a colour. In Gloucestershire it is employed under the name of *cheese colouring*, to give a yellowish-orange tint to cheese, and in Holland to butter. It has never had any great character as a medicine. It is a gentle purgative, and a light stomachic; it has been employed in dysentery, and as an antidote for the bitter Cassada. The Spaniards use it in their chocolate and soups to heighten the flavour and to give a rich agreeable colour. In Jamaica, a liquid preparation is usually kept for culinary purposes, made by boiling the pulp, diffused in water, with sugar and salt to the consistence of cream, which, if put into well-corked bottles, will keep for several years.”

A method recommended by the Director of the Botanic Gardens at Ceylon for preparing Annatto, and which, no doubt, has been followed in the manufacture of some fine samples of Annatto lately exported from that island, is as follows:—“The best method of preparation appears to be (there are some discrepancies in different accounts) the



“ following :—The seeds, with their pulpy envelopes, are pounded in a wooden mortar, and, after adding hot water, the mixture is left in the mortar for several days, after which it is passed through a sieve. The liquid is then left to ferment for eight days, when the water is decanted off, and the deposited pulp left to become concentrated by evaporation in the shade. When it has acquired the consistency of firm putty, it is made up into cakes of  $1\frac{1}{2}$ —2 kilos weight. These are packed with plantain leaves, and have a lively orange-yellow colour ; the value is about 4 fr. the kilo. In Cayenne it would appear that the pulp is sometimes boiled for four or five hours, and afterwards put under weights to squeeze out the water. It is also sometimes made into rolls instead of cakes, in which state it appears to fetch an inferior price.”

\* \* \* \* \*

“ The trade in Annatto is a limited one. It is used as a dye occasionally, but its principal employment is for colouring cheese and butter.”

In *Tropical Agriculture*, p. 389, it is stated that Annatto “ owes its value to the colouring matter bixin and orellin, which constitute about 20 per cent. of good dry Annatto. Fresh Annatto contains more than half its weight of water. It was formerly employed in dyeing wool and silks, but its colour, though beautiful at first, soon fades, and hence it has been abandoned for more permanent dyes.

“ Annatto is principally consumed by painters and dyers, but it is also used to colour cheese with a pale yellow or flesh colour. The Dutch use it for heightening the colour of their butter, and it is employed for the same purpose in some American and English dairies.”

As regards the European process of extracting and preparing Annatto, Ure writes :—

“ Leblond proposed simply to wash the seeds of the *Bixa* till they are entirely deprived of their colour, which lies wholly on their surface ; to precipitate the colour by means of vinegar or lemon-juice, and to boil it up in the ordinary manner, or to drain it in bags as is practised with indigo. The experiments which Vauquelin made on the seeds of the *Bixa* imported by Leblond confirmed the efficacy of the process which he proposed ; and the dyers ascertained that the Annatto obtained in this manner was worth at least four times more than that of commerce ; that, moreover, it was more easily employed, that it required less solvent, that it gives less trouble in the copper, and furnishes a purer colour.

“ Annatto dissolves better and more readily in alcohol than in water when it is introduced into the yellow varnishes for communicating an orange tint.”

The methods described above for the preparation of Annatto are not intended to serve as standards of what the preparation of this substance should be in tropical countries. They are given merely as descriptions of methods hitherto followed, and which produce the “ roll,” “ flag,” and “ cake ” Annatto as usually seen in European markets. If a large demand arose for Annatto, improved methods of preparation would doubtless be soon adopted.

Mr. J. J. Bowrey, F.C.S., Government Analytical Chemist at Jamaica, has prepared powdered Annatto of great strength and brilliancy by treating fresh ripe seed locally, and he has obtained one ounce of colouring matter from one pound of freshly cured seeds. An exhibit, consisting of the cured Annatto seeds, of the colouring matter obtained from them, as well as of flannel dyed with the extract and with the



ordinary Annatto of commerce, was shown at the Jamaica Court at the New Orleans Exhibition in 1885, and attracted considerable attention. At the late Colonial and Indian Exhibition there were numerous samples of Annatto seeds shown from Jamaica. Mr. F. B. Sturridge also exhibited a series of preparations which were described as follows :—

“ 297. Annatto seeds in natural state. 298. Annatto and lard free from foreign substances slightly salted. 299. Annatto washings after principal colouring matter has been extracted, showing colouring portion of seeds, which is soluble in water. 300. Annatto seed and olive oil. 301. Annatto and petroleum, showing amalgamation of colouring matter with any oleaginous substance. 303, 304, 305. Colours from Annatto precipitate and Annatto paints.”

In a letter received at Kew in 1881, from a firm dealing largely in Annatto, it is stated that “the best flag Annatto is decidedly from Cayenne (French Guiana), and it used to come by way of the United States, but it comes now direct from the French ports. The seeds are carefully washed in the preparation it undergoes at Cayenne, the clear fluid being drawn off, and the residuum, with which oil is sometimes mixed, is placed in shallow vessels and gradually dried in the shade. Others use an evaporating pan for this purpose. Annatto is a limited trade with us. There is no scope for making a large fortune in it. One pound of good Annatto will colour one ton of cheese. Guadeloupe Annatto is of a fine colour, but is too acid for our purpose.”

In a recent English trade circular it is stated :—“The dubious mode of curing Annatto, so long pursued in the French colonies, from whence the supplies have been chiefly derived, will, it is thought, ere long be abandoned. It has been proved to be as unnecessary as objectionable.”

\* \* \* \* \*

“Formerly the only extracts or pastes of Annatto were the descriptions known as cake and roll.

“Then followed the liquid extract, which largely superseded, but by no means entirely, the other two, which have still an important sale in various districts. The liquid extract, while it keeps its place for cheese tinting, has yielded in turn to a non-chemical preparation of the pure seeds in refined vegetable oils, selected for sweetness and non-tendency to rancidity or congelation.”

Messrs. S. G. Clements and Co., of Bristol, addressed the following letter to this establishment on the subject of Annatto, dated 14th June, 1887 :—

“Will you permit us to make inquiry bearing on the production of Annatto, with the seed export of which you would be well acquainted while in the West Indies.

“If you find time we should esteem your consideration of the remarks the writer has made in the trade circular enclosed.

“You will see that there is the feeling that more could be done in our own territories with advantage if the mode of preparing were closely studied.

“The value of Annatto *seed* at market is to-day unusually low, good quality having been done at  $2\frac{1}{2}$ d. lately, so that growers cannot be doing well with it. Now, in Ceylon, an extraordinarily fine bright *paste* is made, and we think we purchased the first lots of it brought over, through London brokers, at a much higher price than any paste or flag Annatto then offered in London or Liverpool. It was followed by other lots not quite up to the first grade, and the disparity in



“ values between ‘Cayenne’ best and this ‘Ceylon’ was too great to induce us to go on buying, except in small lots occasionally for mixing and improving. On lately inquiring the value, our brokers tell us the bulk of it is going to the United States of America, and there fetching 3s. 6d. per lb. !

“ Best ‘Portal’ Cayenne is not worth 1s. to-day, so that we are open to doubt the statement to *that extent*; but it all leads to this, that if our Jamaican friends would prepare a few cwts. of *paste* on the Ceylon system they would relieve the depressed condition of their Annatto market. No doubt this method of the Cingalese must be ascertained, but that difficulty might be bridged over by inquiries instituted by those who are known to ask for a public purpose rather than by interested dealers.

“ If, therefore, you could add this to the many far more valuable branches of investigation, which, no doubt, ‘run’ your time already too closely, we feel sure you will excuse the mention of it.

“ Any facts as to Annatto preparations, &c. we should be glad to give so far as they are known on this side only.”

In reply to this letter, it was mentioned that the tendency in the West Indies at the present time is not to manufacture Annatto, but to export the seeds in a cured state. Owing to the fact that prepared Annatto is subject to a heavy duty in America, while the cured seeds, as a raw product, are admitted free of duty, growers have found it more advantageous to ship seeds than prepare the Annatto. As stated above, Annatto seeds were exported during the year 1886, chiefly to America, from Jamaica to the extent of 369,284 pounds, of the value of 7,693l. It is evident that either in the preparation of butterine, and analogous substances, or in some special process of dyeing, Annatto has been found of service in the United States, and an impetus has been given to the cultivation, which has rescued it from the stagnation in which it had remained for more than 20 years. It is only right, however, to point out that Annatto is still a precarious and somewhat uncertain article in commerce, and the demand is distinctly limited; it may, however, receive attention as a subsidiary subject, and to meet the demand in America it is evidently better to gather the seeds, and, after carefully drying them in the sun until quite “cured,” to ship them in ordinary barrels as a raw product. Annatto seeds at Jamaica usually sell locally for 6d. to 10d. per pound. Preparations of Annatto are sold in London, according to Messrs. Burgoyne, Burbidges, Cyriax, and Farries Prices Current, June 1887, as follows:—“Spanish flag, re-rolled, No. 1, 3s. 3d. per pound; “Cake (Fulwood), 3s. 6d. per pound; extra super, 3s. 9d. per pound.”

A further letter, which has been received from Messrs. S. G. Clements & Co., dated 17th June 1887, contains some useful hints, which may be of service in the colonies:—

“ We are much obliged by your reply on Annatto production.

“ It should not be overlooked that seed though gradually taking the place of paste and flag (*i.e.* wrapped in flag). Annatto is too low to pay, being procurable in quantity in England at less than 3d. per lb. “ Indeed 8d. was a very high price for it several years ago. We do use the seed continuously and the paste and flag also.

“ The latter from Guadaloupe is *now* about the value of the seed, or under 3d., but the Cayenne best brands are more than thrice that in first hand—more than 9d. per lb.

“ There is when certain colours are prevalent, a large demand for flag Annatto or cotton and for silk dyeing, and we must expect



“ Annatto to rise in value. We may state that a year or two ago the  
 “ Guadeloupe even rose to 10*d.* and 11*d.* per lb., or more, for a short  
 “ time.

“ It shows that addiction to one branch of production only debars  
 “ from constantly taking the market, while by a versatility of treatment  
 “ produce may always fetch the highest value for that form of it most  
 “ in demand at the time.

“ Our colonial friends might reasonably vie with the French West  
 “ Indians in sending paste and flag Annatto to European markets, or if  
 “ they would observingly ‘distil out,’ as it were, a better method,  
 “ approaching, we think, rather the Sinhalese than the Cayenne or the  
 “ Guadeloupe, drive the two latter from these markets.

“ There is another form of Annatto, viz. ‘Roll’ from Brazil. It is  
 “ worth in its best state of cure 1*s.* 9*d.* per lb. to-day, and even more  
 “ is asked by the brokers. This sort has very little staining power,  
 “ but is pleasanter smelling, and is put up in rush baskets of about  
 “ 40 lbs. each, apparently as much as a man could trot with on his  
 “ shoulder. Why this kind cannot be made by our colonists we are at  
 “ a loss to know. Is the Brazil Rocou or Bixa another species? [No.]

“ We endeavoured to persuade Demerara shippers here in Bristol to  
 “ get Annatto preparing taken up in British Guiana. Inquiries were  
 “ made, but it was replied [that, though the trees were abundant, the  
 “ industry was not large enough, side by side with sugar and rum, to  
 “ engage their attention. Perhaps, though, other of our West Indian  
 “ friends might profitably give some time to this as one of the smaller  
 “ (but easy) industries, which, combined, might ‘pare out’ as profitably  
 “ as the bulkier ones now slipping from their grasp. And the wish to  
 “ foster effort after such substitutes must be our excuse for diverting  
 “ your attention thus far.”

Messrs. Fulwood and Bland, one of the oldest manufacturers of  
 Annatto in this country, mention that it would be of service to growers  
 of Annatto to learn that seed should only be shipped to London where  
 appliances for preparing Annatto locally entirely fail. It is, in their  
 opinion, better to prepare good high class Annatto in the Colonies than  
 ship seed. The latter can only fetch about 3½*d.* to 6*d.* per pound for  
 good sound seed, while inferior or mouldy consignments are dear at any  
 price. The price of Flag Annatto varies from 5*d.* to 1*s.* 8*d.* per pound;  
 but if really good Annatto, prepared under European supervision,  
 became established in London, it would supersede most of the present  
 French Annattos, which are, as a rule, of inferior quality.

In the Kew Museum of Economic Botany there is a very interesting  
 series of Annatto from nearly every portion of the Tropics. These  
 consist of cake Annatto from Madras, presented by Dr. Cleghorn;  
 Fullwood’s Annatto, one of the best preparations in the English market,  
 from A. S. Hill and Son; Annatto from Jamaica, by H. Battcock;  
 Annatto from British Guiana, International Exhibition, 1862; Annatto  
 mixed with crab oil from British Guiana, International Exhibition, 1862.  
 “Faroah” paint, used by Indians, made from seeds of *Bixa Orellana*,  
 British Guiana, E. F. in Thurn; sample of flag Annatto of commerce;  
 fruit and seeds of Annatto, Bombay, from India Museum; fruits of  
 Annatto from Samoa, Rev. J. Powell; from Venezuela, International  
 Exhibition, 1862; from the Amazon, Dr. Traill; seeds of Annatto from  
 Madras, Calcutta, and British Burma; “Achota” seeds from Peru,  
 Paris Exhibition, 1878; and Annatto seeds as usually exported from  
 Jamaica, Colonial and Indian Exhibition, 1886.



### XIII.—BOTANICAL STATIONS IN THE WEST INDIES.

In the *Bulletin*, No. 6, June 1887, there was discussed with some fulness a scheme which has been devised for extending the benefits of Botanical Gardens to the smaller islands in the West Indies. Since the issue of that *Bulletin* further information has been received, which is now given in order to complete the historical sequence. It will be noticed that the Government of Jamaica is prepared to adopt the scheme from the 1st August next.

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COLONIAL OFFICE to ROYAL GARDENS, KEW.

SIR,

Downing Street, 3rd June 1887.

I AM directed by the Secretary of State for the Colonies to transmit to you, for your information, with reference to your letter of the 19th of February last and previous correspondence, the accompanying copy of a Despatch from the Governor of Jamaica, relating to the proposed establishment of Botanical Stations in the West Indies.

I am, &c.

The Director of the Royal Gardens,      ROBERT G. W. HERBERT.  
Kew.

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Enclosure No. 1.

Sir HENRY NORMAN to Sir HENRY HOLLAND.

Jamaica, No. 15.

SIR,

King's House, 10th May 1887.

WITH reference to the correspondence, which I had the honour to hold with you while recently in England, on the subject of the scheme for the establishment of a system of Botanical Stations in the West Indies, having its centre at Jamaica, and with reference to an interview I had with Mr. Thiselton Dyer and Mr. Morris at Kew last March, I have the honour to forward, for your information, copy of a letter which I have addressed to the Governor of Barbados, and to the Governors of the other Colonies, mutatis mutandis, interested in the matter, after receiving the remarks of Mr. Fawcett, Director of Public Gardens and Plantations, on the memorandum which Mr. Morris submitted to you.

I have, &c.

(Signed) H. W. NORMAN,  
Governor.

The Right Hon. Sir Henry Holland, Bart.,  
G.C.M.G., M.P.,

&c.

&c.

&c.

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## Enclosure No. 2.

The GOVERNOR of JAMAICA to the GOVERNORS of BARBADOS, the LEEWARD ISLANDS, the WINDWARD ISLANDS, and BRITISH HONDURAS respectively.

No. 3421.

King's House, Jamaica,  
9th May 1887.

SIR,

I HAVE the honour to inform you that the Secretary of State for the Colonies communicated to me a copy of a Despatch which Lord Derby had addressed to you, in common with the Governors of other West Indian Islands, transmitting copies of a letter from Mr. Morris, the Director of Public Gardens and Plantations in Jamaica, now of the Royal Gardens, Kew, respecting a proposal made in 1884 that Botanical Stations should be established in some West India Islands in connexion with the Botanical Department in Jamaica, and recommending the adoption of the scheme in those colonies.

2. I would further inform you that I am advised that the colonies named in the margin are prepared to join with the colony under your Excellency's administration in establishing Botanical Stations, and to provide twenty pounds (20*l.*) a year each towards the expenses of the Jamaica Botanical Establishment in carrying out the scheme.

3. I have recently received a copy of a subsequent memorandum from Mr. Morris to the Colonial Office, setting forth some of the working details of the scheme, of which I beg leave to enclose a copy for your Excellency's information, inviting your remarks upon it.

4. I desire to inform you that this colony is prepared to adopt the proposed scheme from the 1st August next, or from any subsequent date, and I would suggest that the local superintendent of the Botanical Department (if there is one) should communicate on the subject direct with Mr. Fawcett, the Director of Public Gardens and Plantations in this island.

5. As regards the carriage of plants, I would suggest that application be made to the Royal Mail Steam Packet Company for the free carriage, or the carriage at low rates, of plants.

I have, &c.

(Signed) H. W. NORMAN,  
Governor.

DOMINICA.—Reference was made in *Bulletin*, No. 6, pp. 9 and 10, to the collection of economic plants already made at St. Arment, Dominica, by the late Dr. Imray and Dr. H. A. Alford Nicholls. Many of these plants have been sent out from Kew in exchange for Dominica plants, kindly contributed at the private expense of the two gentlemen above mentioned. In connexion with the establishment of a Botanical Station or a Botanical Garden, it may be useful to place on record a list of the introduced economic plants already growing at Dominica, which has been kindly prepared by Dr. Nicholls:—

Abelmoschus moschatus - -	Musk Mallow - -	India.
Adansonia digitata - -	Baobab, or Monkey Tamarin	Africa.
Aleurites moluccana - -	Candle-nut - -	Pacific Islds.
Allamanda Aubletii - -		Guiana.
Amomum Melegueta - -	Grains of Paradise - -	Trop. Africa.
Areca Catechu - -	Betel Nut - -	E. Indies.



Artocarpus integrifolia - -	Jack Fruit - -	Polynesia.
"    Lakoocha - -	Lakoocha - -	E. Indies.
Averrhoa Carambola - -	Caramba - -	"
"    Bilimbi - -	Blimbing - -	"
Baloghia lucida - -	Blood Wood - -	Norfolk Isld.
Bambusa gigantea - -	Giant Bambu - -	E. Indies.
"    stricta - -	Male Bambu - -	"
Blighia sapida - -	Akee - -	Africa.
Brownea arhiza - -	- - - -	Trop. America.
Camellia theifera - -	Tea - -	Assam.
Caryophyllus aromaticus - -	Clove - -	Moluccas.
Cassia Fistula - -	Purging Cassia - -	E. Indies.
"    grandis - -	Horse Cassia - -	Brazil.
Chloroxylon Swietenia - -	Satin Wood - -	India.
Chrysophyllum Cainito - -	Star Apple - -	W. Indies.
"    oliviforme - -	Star Plum - -	"
Cinnamomum Cassia - -	Cassia - -	China.
"    zeylanica - -	Cinnamon - -	Ceylon.
Citrus Limonum - -	Lemon - -	Cultivated.
Citrus medica - -	Citron - -	"
Cæsalpinia coriaria - -	Divi-divi - -	S. America.
Coffea liberica - -	Siberian Coffee - -	Africa.
Cola acuminata - -	Kola Nut - -	W. Trop. Africa.
Cookia punctata - -	Wampee - -	China.
Corypha umbraculifera - -	Talipot - -	Ceylon.
Dipterix odorata - -	Tonquin Bean - -	Guiana.
Durio zibethinus - -	Durian - -	Ind. Arch.
Elettaria Cardamomum - -	Cardamoms - -	India.
Elaeis guineensis - -	Oil Palm - -	W. Trop. Africa.
Epipremnum mirabile - -	Tonga - -	Polynesia.
Eriobotrya japonica - -	Loquat - -	China.
Erythrina umbrosa - -	Immortelle - -	Trop. America.
Erythroxylon Coca - -	Coca - -	Peru.
Ficus elastica - -	India-rubber - -	India.
"    Cooperi - -	- - - -	Queensland.
"    macrophylla - -	- - - -	Australia.
Furcraea cubensis var. inermis - -	Silk Grass - -	W. Indies.
Galactodendron utile - -	Cow Tree - -	Venezuela.
Garcinia Morella - -	Cambooge - -	Ceylon.
"    Mangostana - -	Mangosteen - -	Ind. Arch.
Grias cauliflora - -	Anchovy Pear - -	Jamaica.
Guaiacum officinale - -	Lignum vitæ - -	W. Indies.
Hemidesmus indicus - -	Indian Sarsaparilla - -	E. Indies.
Hevea brasiliensis - -	Para Rubber - -	Brazil.
Jatropha podagrica - -	- - - -	Central America.
Jambosa malaccensis - -	Malay Apple - -	E. Indies.
Kopsia fruticosa - -	- - - -	"
Landolphia florida - -	African Rubber - -	Trop. Africa.
"    Kirkii - -	- - - -	E. Trop. Africa.
Lawsonia inermis - -	"Mignonette" Tree - -	E. Indies.
Malpighia glabra - -	Barbados Cherry - -	W. Indies.
Manihot Glaziovii - -	Ceara Rubber - -	Brazil.
Mangifera indica - -	Mango - -	E. Indies.
Maranta arundinacea - -	Arrowroot - -	S. America.
Melicocca bijuga - -	Genip Tree - -	W. Indies.
Michelia Champaca - -	Chumpaka - -	E. Indies.
Mimusops Elengi - -	- - - -	Ceylon.
Monstera deliciosa - -	- - - -	Mexico.
Moringa aptera - -	Ben Tree - -	N.E. Africa.
Myristica fragrans - -	Nutmeg - -	Ind. Arch.
Myroxylon toluifera - -	Balsam Tree - -	S. America.
Musa superba - -	Flowering Plantain - -	- - - -
Napoleona imperialis - -	Napoleona - -	W. Africa.
Nephelium Litchi - -	Litchi - -	China.
Phoenix dactylifera - -	Date Palm - -	N. Africa.
Phyllanthus distichus - -	Nelli - -	E. Indies.
Phytelephas macrocarpa - -	Ivory Nut - -	S. America.



Pithecolobium (Inga) Saman	-	Guango	-	S. America.
Pimenta vulgaris	-	Allspice	-	W. Indies.
Piper methysticum	-	Kava-Kava	-	Pacific Isds.
" nigrum	-	Black Pepper	-	E. Indies.
Piscidia Erythrina	-	Jamaica Dogwood	-	W. Indies.
Psidium cattleianum	-	Purple Guava	-	"
Ravenala madagascarensis	-	Travellers Palm	-	Ma agascar.
Rubus rosæfolius	-	Tropical "Raspberry"	-	E. Indies.
Sansevieria guineensis	-	African Hemp	-	Africa.
Spondias dulcis	-	Sweet Plum	-	Society Islds.
" tuberosa	-	Hog Plum	-	Trop. America.
Stiffia chrysantha	-	"	-	Brazil.
Strelitzia reginæ	-	"	-	S. Africa.
Strychnos nux-vomica	-	Nux-Vomica	-	Eastern Tropics.
Swietenia Mahagoni	-	Mahogany	-	W. Indies.
Tamarindus indica	-	Tamarind	-	E. Indies.
Tanghinia venenifera	-	Tanghin	-	Madagascar.
Terminalia Catappa	-	Java Almond	-	Tropics.
Thrinax argentea	-	Silver Thatch	-	W. Indies.
Treculia africana	-	African Bread-fruit	-	W. Africa.
Vanilla planifolia	-	Vanilla	-	Trop. America.
Vangueria edulis	-	Voa-Vanga	-	Madagascar.
Yucca aloifolia	-	"Dagger" plant	-	America.
" gloriosa	-	Adam's needle	-	"
Zingiber officinale	-	Ginger	-	Tropics.
Zizyphus rugosus	-	Jujube	-	Old World Tropics.

*Note.*—Besides the plants enumerated above, there are established at St. Aroment about 30 species of palms from various parts of the world, which are doing well.

GRENADA.—The new Botanic Garden at Grenada has already been noticed. It is situated a short distance from the town of St. George, on the road leading to Clarke's Court. The locality is described by His Excellency the Governor-in-Chief as a "good site, well watered, accessible, and apparently in every way suitable for the purpose." A grant of 300*l.* was made by the Legislative Council in October 1885, and a further sum of 1,000*l.* was provided in July 1886 to establish and lay out a Botanic Garden and erect a house for the Curator. The objects of the Garden are stated as follows: To introduce and distribute plants of great economic value, to supply practical hints respecting new and promising industries, and to develop and improve existing minor industries. In the first Report, lately issued, it is stated that "two Wardian cases containing very valuable plants were received from Kew in July last, and 108 packets of various economic seeds have also been received from the same source."

The initiative as regards a Botanic Garden at Grenada is due to His Excellency W. J. Sendall, C.M.G., and to him and to Captain Maling and members of the Garden Committee the success of the efforts so far made is due.

A letter has lately been addressed to Kew by Mr. W. R. Elliott, the Curator, which, as it gives the most recent account of this Garden, may prove of interest.

Mr. W. R. ELLIOTT to ROYAL GARDENS, KEW.

Botanic Garden, Grenada,

11th June 1887.

SIR,

I HAVE to acknowledge the receipt of your letter *in re* the seed of *Buchanania latifolia*, received from you in September last, and to



inform you that I have succeeded in raising a large number of plants. I have distributed numbers throughout the island, all of which are growing very satisfactorily.

I am happy to be able to report good progress with our Botanic Garden here. The laying out is completed, and the Gardens are to be thrown open to the public this month. The water difficulty has been only partly surmounted, and during the late dry season considerable difficulty was experienced in keeping things alive. The wet season has, however, now commenced, and there is every sign of a repetition of last year's; and it is to be hoped that before the dry season of next year returns we shall have a good water supply.

The plants received from Kew in the two Wardian cases last year are thriving remarkably well; one plant of *Manihot Glaziovii* is 20 ft. high, and flowering profusely. I intend returning the cases in the course of two or three mails; one I am anxious to fill with a small palm I found growing on the summit of *Irdous Camp*, our second mountain in height, about 2,700 ft. This palm completely covers the entire summit of the hill, to the exclusion of every other tree; I believe it is *Hyospathe pubigera*. Unfortunately, I was unable to obtain good botanical specimens, but succeeded in getting numbers of small plants.

By the mail leaving here on 26th instant I am sending, for determination at Kew, a large parcel of specimens of ferns, &c. collected on this hill and elsewhere.

I have a fine plantation of tobacco, about one acre, raised from the Havana seed you sent me.

I am, Sir,  
Yours very faithfully,  
(Signed) W. R. ELLIOTT.

D. Morris, Esq., M.A., F.L.S.,  
Assistant Director,  
Kew.

D. M.









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